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ABSTRACT

This report examines the variations in salaries by degree level, employment sector, geographic location, and work activity among members of the scientific labor force and educational system. The data are based on a stratified random sample of one-sixth of the U.S. membership of the American Institute of Physics Member Societies; approximately 14,400 members were queried, and 64% responded. Most of the analyses presented are based on median and quartile salaries. Mean salaries, standard deviations, and median ages are also presented for comparative purposes. Twenty-six tables of data are provided and are divided into the following categories: (1) salaries and geographic location for PhDs; (2) salaries and employment sector for PhDs; (3) salaries for Masters and Bachelors; (4) salaries and primary work activity; (5) PhD salaries for males and females; and (6) salaries and employment sector for PhDs, American Geophysical Union members. Appendixes detail the geographic divisions used in the analysis and provide technical notes. (GLR)

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AIP REPORT

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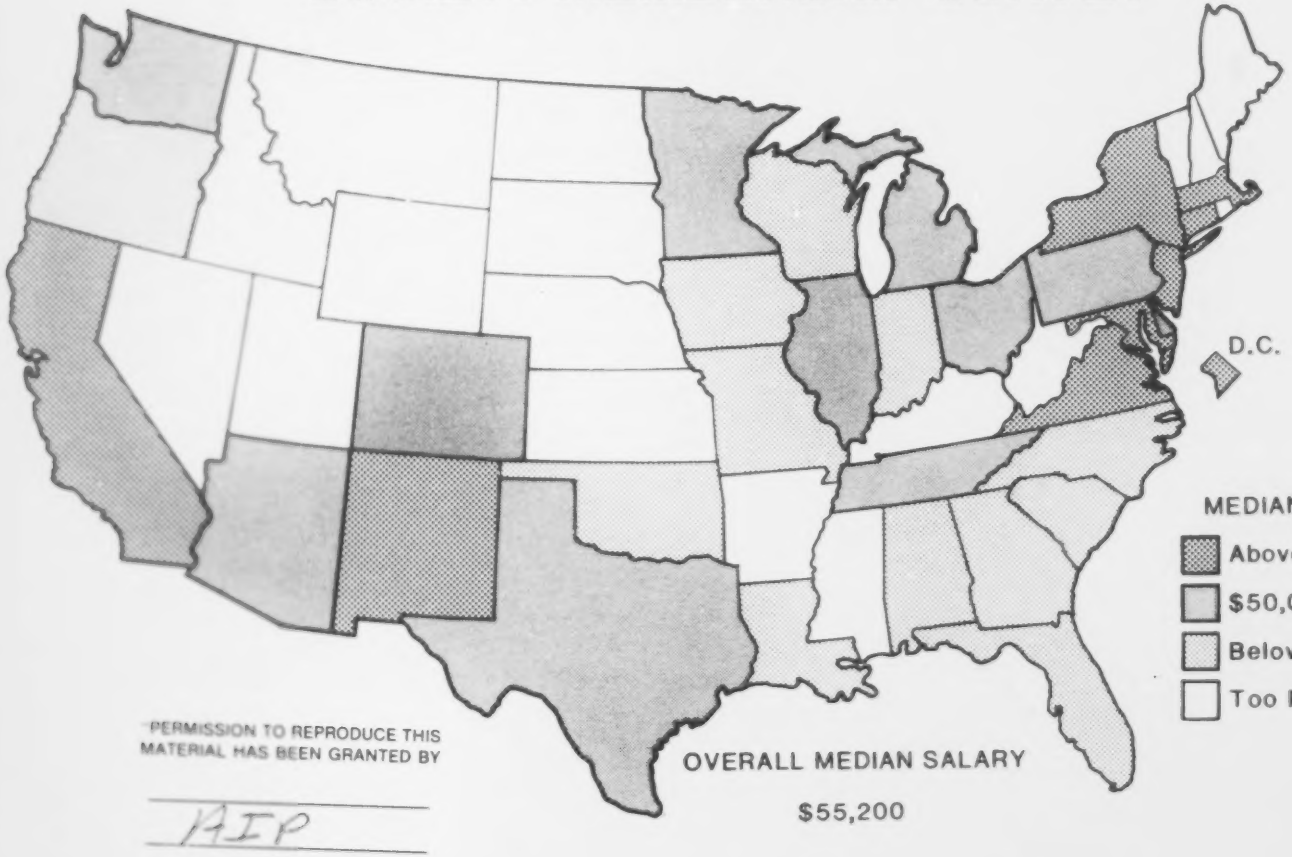
1989 SALARIES:
SOCIETY MEMBERSHIP SURVEY



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1989 SALARIES:

SOCIETY MEMBERSHIP SURVEY

Dawn Kellman and Catherine Scholz

The American Physical Society
Optical Society of America
Acoustical Society of America
The Society of Rheology
American Association of Physics Teachers
American Crystallographic Association
American Astronomical Society
American Association of Physicists in Medicine
American Vacuum Society
American Geophysical Union

COVER (1)

This figure illustrates the variation in median salaries by state of residence. California and several states in the sunbelt and along the eastern coast maintain the greatest concentration of society members and the highest PhD salaries in the nation. Heavy representation of industry, government, and national laboratories within these states, and the higher salaries associated with such employment, account for the salary distribution found within these areas. States where relatively low salaries are observed (the Plains and Southeastern states) generally have relatively few society members, most of whom are academically employed. Where shading is absent, there are too few society members to report reliable median salaries.

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INTRODUCTION

By 1989 the median salary of society members rose to $52,500. Among PhDs, who comprise two-thirds of the membership, the median salary rose to $55,200. These figures represent apparently small increases over previous levels, reflecting a dampening trend in salary compensation.

Overall figures, however, supply only part of the picture. Society members are a diverse group. By and large, members identify themselves as physicists. But engineers, chemists, and astronomers are also well represented, as are scientists working in related disciplines. In addition, as indicated in Figure 1, members are employed in many sectors of the economy. Among older society members, academic employment is most common, whereas younger society members are more likely to be employed outside academe.

Salaries vary widely by degree level, employment sector, geographic location and work activity. This report examines these variations in some detail. The data are based on a stratified random sample of one-sixth of the U.S. membership of the AIP Member Societies. Of the approximately 14,400 members who were queried in March 1989, 64% responded.

Salaries reported by members of nine of AIP's ten Member Societies are discussed in the main body of this report. AIP's newest Member Society, the American Geophysical Union (AGU), is examined separately in the final section. Data in this section are based on a random sample of AGU's "regular members" and cannot be compared to published 1987 AGU data. The 1987 salary data were based on responses from fellows, life-time and student members, as well as "regular members."

Most of the analyses presented here are based on median and quartile salaries, which are the preferred descriptive measures of central tendency in typically skewed salary distributions. Mean salaries, standard deviations and median ages are also presented for comparative purposes. See Appendix B for definitions and technical notes on the measures used in this report.

One note of caution: a significant difference exists between the data presented in this report and previously published data. Since the survey's inception in 1979, respondents have been asked to provide their annual salary, not including benefits or pensions. In 1989 the questionnaire was refined; respondents were asked to provide their principal salary, excluding not only benefits and pensions, but also excluding income derived from summer teaching, bonuses or overtime pay. Although this rephrasing provides a more accurate picture of primary salaries, it also tends to depress 1989 salaries with respect to earlier published figures, making exact comparisons with earlier data inappropriate, particularly in the academic sector.

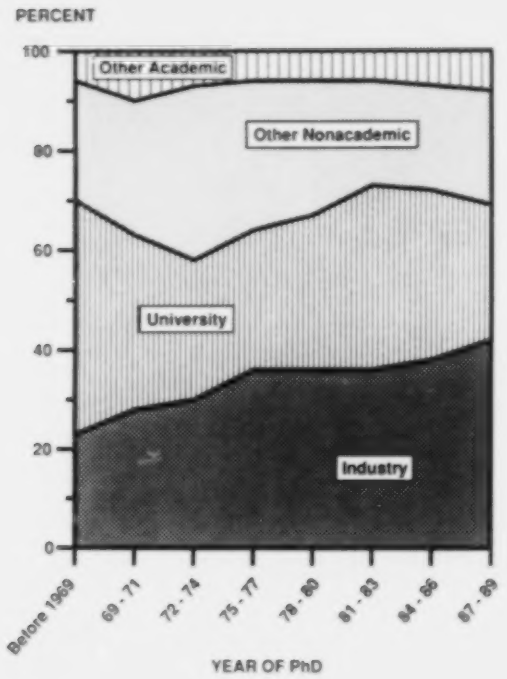

Figure 1. Current employer type by year of PhD, 1989. Does not include members of the American Geophysical Union.

Comparisons of data over time will, however, be possible in future salary reports using the refined definition of income. This clarification of the questionnaire will allow us to analyze in close detail the effect an increasingly recessionary climate has had on society members' salaries.

Readers seeking more in-depth information are encouraged to contact the Education and Employment Statistics Division.

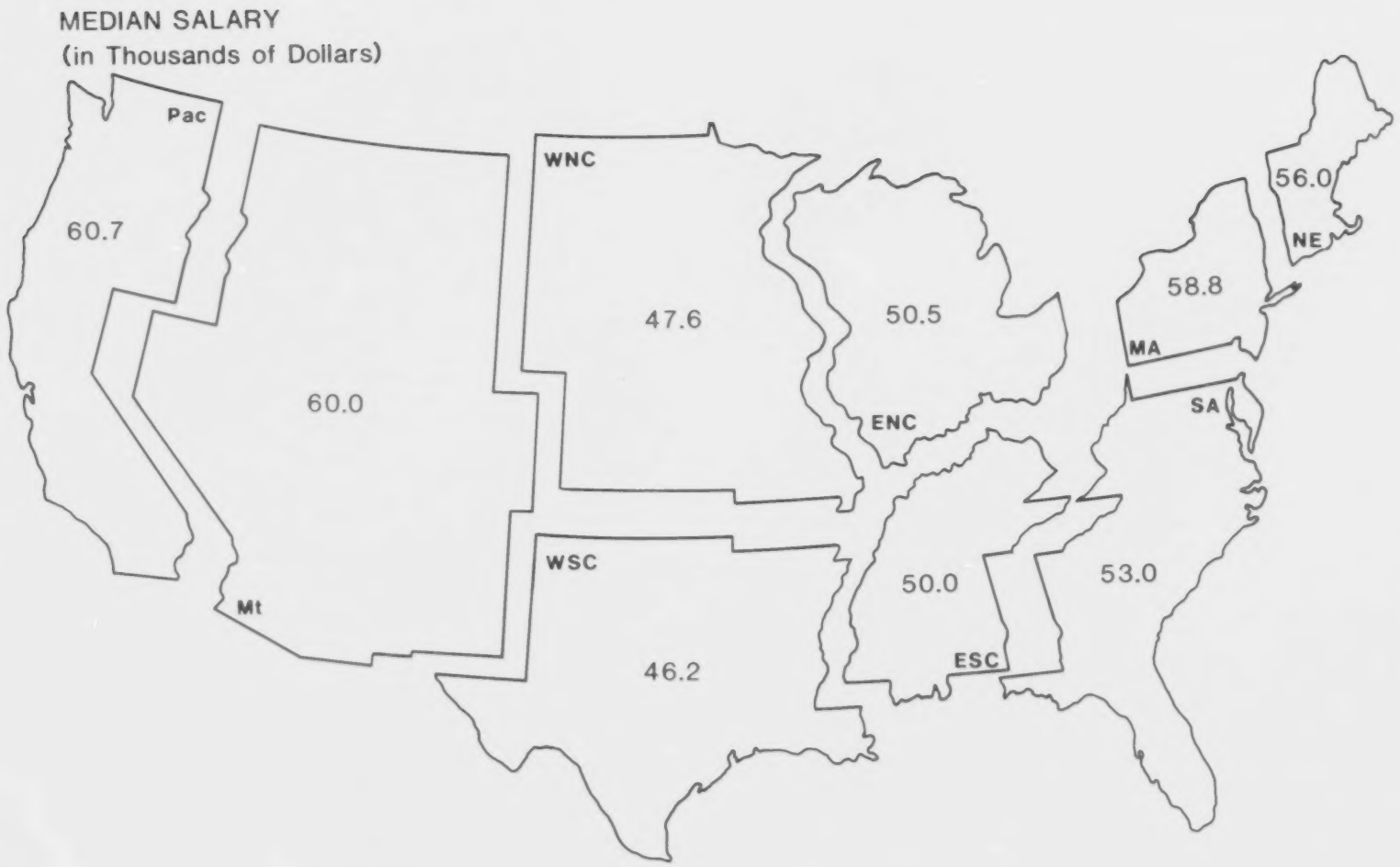

Figure 2. Variation in median salary for PhDs by geographic division, 1989.

Table 1. 1989 salaries by geographic division, PhDs.[a]

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
New England	56.0	58.3	23.7	44	402
Middle Atlantic	58.8	61.7	25.3	45	739
South Atlantic	53.0	55.5	19.5	46	710
East North Central	50.5	53.2	21.3	46	514
East South Central	50.0	51.3	17.2	46	153
West North Central	47.6	52.4	24.2	45	167
West South Central	46.2	50.3	21.9	45	232
Mountain	60.0	59.6	19.4	46	350
Pacific	60.7	63.0	24.4	44	826

[a] *See Appendix A for state composition of each division.*

SALARIES AND GEOGRAPHIC LOCATION FOR PhDs

• Salary levels vary widely among the geographic divisions of the U.S. The three main factors contributing to these differences are (1) the distribution of employment sectors within each division; (2) the salary structure for each employer type; and (3) age variations across geographic locations.

• From one part of the country to the next, industrially employed society members earn more than their academically employed colleagues. The gap between median salaries in industry and academe ranges from a low of $14,000 in the West North Central to $21,000 in the West South Central.

• Despite the fact that they are among the youngest of all society members, residents of the Pacific division report earning the highest median salary nationwide, $60,700. This is mainly due to the heavy concentration of private sector employment in California, the most populous state in the division. Industry accounts for roughly 40% of all employment in the Pacific, a larger proportion than anywhere else in the U.S.

Table 2. 1989 salaries by selected employment sector and geographic division, PhDs.

	Academic			Industry			Other		
	Median Salary	Median Age	%	Median Salary	Median Age	%	Median Salary	Median Age	%
New England	48.0	45	51	65.0	44	30	57.0	41	19
Middle Atlantic	49.0	47	43	66.4	42	45	59.0	45	12
South Atlantic	43.9	47	38	56.0	43	20	60.0	47	42
East North Central	45.0	48	62	60.0	44	20	55.0	43	18
East South Central	39.5	46	50	*	*	9	59.8	47	41
West North Central	42.0	48	65	56.0	41	26	*	*	9
West South Central	41.0	47	67	62.0	43	23	*	*	10
Mountain	43.0	47	32	60.0	46	14	65.0	45	54
Pacific	50.0	46	33	65.0	43	39	63.6	44	28
Overall	45.0	47	45	63.5	43	29	60.0	45	26

**Number of respondents was too small to calculate reliable medians.*

• With a median annual salary of $60,000, members employed in the Mountain states report earnings which are second only to those in the Pacific. This high level of compensation can be attributed to the presence of large, well paying national laboratories in New Mexico, including Los Alamos National Laboratory and Sandia National Laboratory.

• Approximately two out of every three members who reside in the West South Central and West North Central are employed in academe. This proportion of academics is larger than that in any other part of the country, and accounts for the relatively low salaries reported in these divisions.

• The Middle Atlantic is comprised of three very disparate states. New Jersey tends to be heavily industrial, with two out of every three members working in an industrial setting. In Pennsylvania the situation is reversed; two-thirds of all members working in this state are in an academic environment. The New York employment scene is evenly split between academic and nonacademic sectors.

Table 3. 1989 salaries and employment sector distribution for selected states, PhDs.[a]

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known	Academic %	Industry %	Gov't %	FFR&DC %	Other %
	(in thousands of dollars)									
Alabama	40.5	47.3	18.5	45	40	65	16	12	–	7
Arizona	52.0	52.2	18.2	45	42	69	19	1	9	2
California	62.0	64.8	24.5	44	730	28	41	4	22	5
Northern	63.0	65.5	23.0	43	357	25	35	4	30	6
Southern	61.0	64.1	25.9	45	372	32	47	5	13	3
Colorado	53.0	56.6	22.5	47	62	42	33	14	8	3
Connecticut	56.5	56.8	19.4	45	67	50	39	5	–	6
Delaware	50.0	54.1	17.7	41	28	21	69	–	–	10
DC	59.7	59.0	15.2	47	141	10	4	78	1	7
Florida	45.0	50.3	21.0	43	84	69	19	8	–	4
Georgia	42.0	48.5	20.7	47	41	83	12	–	–	5
Illinois	52.1	54.9	20.6	43	164	46	19	1	27	7
Indiana	42.0	46.8	17.6	45	63	92	8	–	–	–
Iowa	48.4	52.7	20.4	48	29	86	4	–	7	3
Louisiana	36.0	38.9	13.6	47	33	93	3	1	–	3
Maryland	56.7	57.4	19.4	46	212	25	24	42	2	7
Massachusetts	56.2	59.8	24.6	43	284	49	29	8	8	6
Michigan	56.0	59.6	30.7	48	92	60	29	–	–	11
Minnesota	50.2	56.0	21.8	42	58	47	47	–	2	4
Missouri	46.2	52.4	30.5	48	50	66	22	–	–	12
New Jersey	62.0	66.6	24.6	42	211	21	67	5	4	3
New Mexico	65.0	65.0	17.6	45	192	12	7	2	78	1
New York	59.8	61.8	25.9	47	371	45	41	1	8	5
Northern	55.0	57.7	21.8	46	182	57	39	2	–	2
Southern	63.0	65.7	28.9	48	189	34	42	–	16	8
North Carolina	45.0	48.5	17.5	48	51	78	12	6	–	4
Ohio	51.5	52.0	16.0	48	136	60	20	14	1	5
Oklahoma	43.0	45.5	16.3	43	22	68	28	2	–	2
Oregon	42.5	45.7	23.8	47	29	87	10	–	–	3
Pennsylvania	53.1	55.1	23.2	45	157	66	26	4	2	2
South Carolina	42.5	48.3	17.2	49	22	78	20	–	2	–
Tennessee	51.1	53.7	17.0	46	86	39	8	1	51	1
Texas	51.0	53.7	23.2	44	169	61	28	2	–	9
Virginia	57.0	60.3	21.6	46	118	35	27	22	12	4
Washington	50.0	50.5	15.8	46	56	53	34	1	9	3
Wisconsin	45.0	47.8	16.5	47	57	79	18	–	–	3

[a] *Several states were not included above because the number of respondents was too small to calculate reliable statistics.*

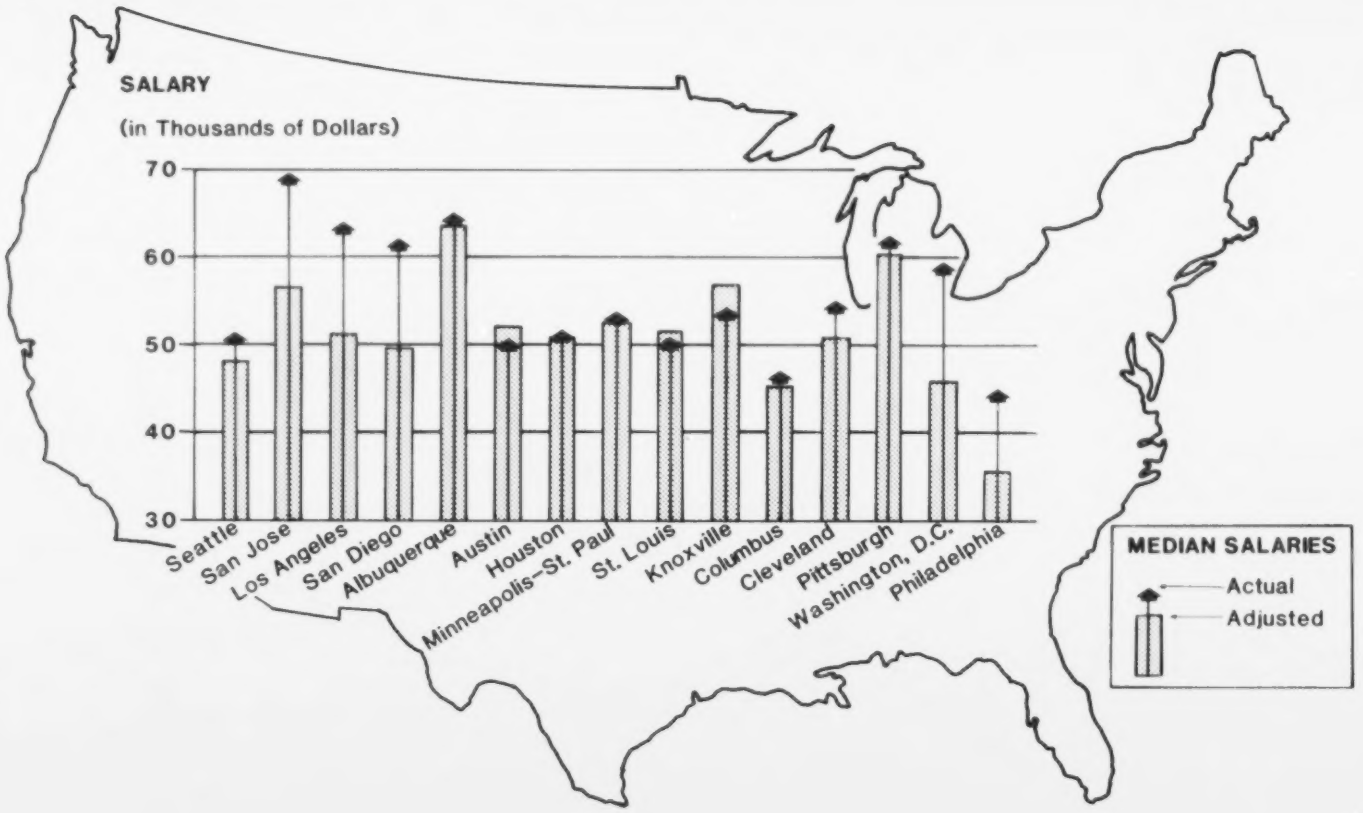

Figure 3. Median salaries for PhDs in selected metropolitan areas, 1989. Both actual salaries and salaries adjusted for cost of living are presented.

• The cities listed in Table 4 volunteered to participate in a survey conducted by the American Chamber of Commerce Researchers Association (ACCRA). The survey was developed to "provide a useful and reasonably accurate measure of living cost differences among urban areas." Certain large cities, such as New York, Chicago and San Francisco, are notably absent from the table. These cities opted not to respond to the ACCRA survey.

• The cost of living index presented in Table 4 reflects relative price levels for a market basket of consumer goods and services during the first quarter of 1989. The national average is set at 100; all indexes above 100 represent a relatively high cost of living, while those below represent a relatively low one.

Table 4. 1989 median salaries adjusted for cost of living in selected metropolitan areas, PhDs.[a]

	Cost of Living Index	Median Salary	Adjusted Salary	Median Age	Academic %	Non-Academic %	Total Number Known
Albuquerque	102.3	65.0	63.5	46	16	84	64
Austin	95.9	50.2	52.3	43	82	18	44
Cleveland	108.7	55.0	50.6	49	47	53	29
Columbus	104.0	47.0	45.2	49	86	14	24
Houston	101.7	51.0	50.1	42	50	50	46
Knoxville	95.4	54.2	56.8	47	26	74	66
Los Angeles	124.4	64.0	51.4	45	30	70	122
Minneapolis–St. Paul	101.7	53.4	52.5	41	45	55	50
Philadelphia	127.2	45.0	35.4	43	71	29	49
Pittsburgh	103.9	62.4	60.1	48	47	53	36
St. Louis	98.9	51.0	51.6	47	42	58	25
San Diego	124.5	62.0	49.8	46	24	76	74
San Jose	123.0	69.4	56.4	42	13	87	47
Seattle	106.4	51.0	47.9	45	66	34	29
Washington, D.C.	129.8	59.7	46.0	47	10	90	141

[a] *Cost of Living Index from the American Chamber of Commerce Researchers Association, national average = 100.0.*

$$\textit{Adjusted salary} = \frac{\textit{Median Salary}}{\textit{cost of living \%}}$$

• There is a direct relationship between the population size and the cost of living of a metropolitan area. Society members tend to reside in large expensive urban areas where employment opportunities are most likely to be found for physicists with advanced training. Consequently, only three cities listed in Table 4 have a cost of living below the national average: Austin, Knoxville, and St. Louis.

• In several cities, the cost of living is so high that although society members' median reported salaries are above the national average of $55,200, their adjusted salaries, which take expenses into account, fall below the national average. This is true of Los Angeles, San Diego, and Washington, DC. Although not a respondent to the 1989 ACCRA survey, New York City has also traditionally been ranked among the most expensive urban centers in the nation.

• Members residing in Albuquerque, Knoxville, Pittsburgh and San Jose maintain adjusted salaries above the national median. In Albuquerque and Knoxville, a high proportion of nonacademic employment, in combination with reasonable living expenses, translates into high median adjusted salaries. In San Jose, industrial employment pays so well that, despite a very high cost of living, members manage to retain strong spending power.

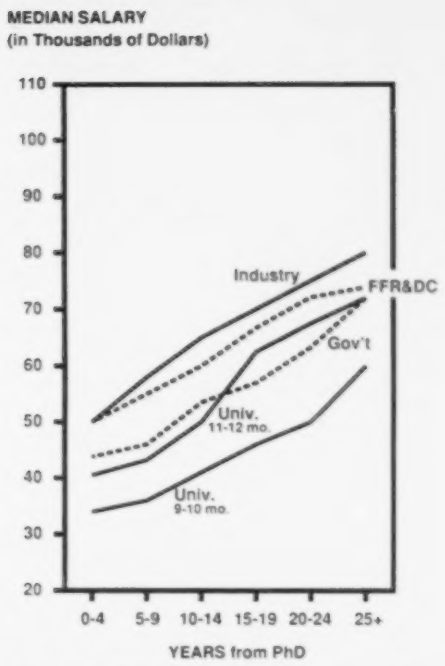

Figure 4. Median salaries by type of employer and years from PhD, 1989.

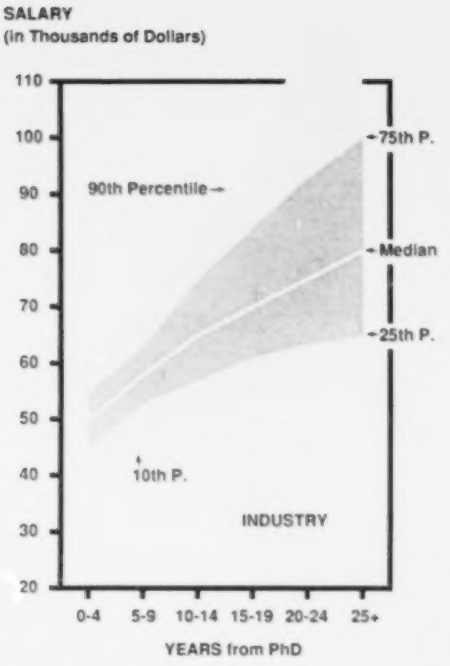

Figure 5. Salary structure in industry by years from PhD, 1989.

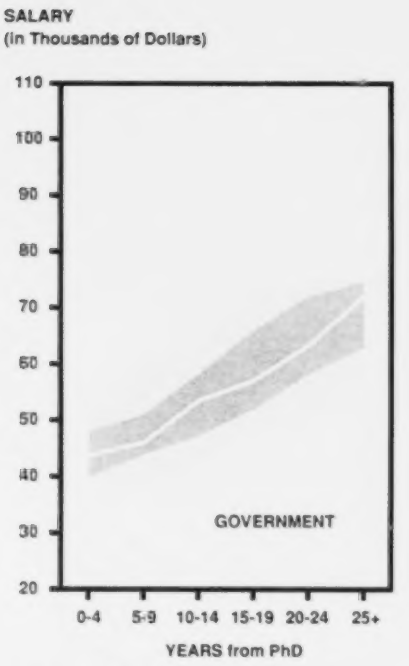

Figure 6. Salary structure in government by years from PhD, 1989.

SALARIES AND EMPLOYMENT SECTOR FOR PhDs

- PhDs comprise over two-thirds of the society membership. In 1989, the median salary reported by society members with doctorates was $55,200. This figure represents a 8.2% increase over the 1987 median of $51,000. Rates of compensation vary widely with employment sector. In 1989, median salaries ranged from $36,600 in four-year colleges with a 9–10 month base to $63,500 among industrially employed society members.
- Each occupational sector has its own unique salary distribution. At lower levels of experience, salaries in all sectors fall into a fairly narrow range, increasing steadily for the first 15 years after receipt of doctorate. After 15 years of professional experience, however, median salaries level off and variations both within and among the occupational sectors become increasingly pronounced.
- Recent doctorate recipients working in industry and at the national laboratories command the highest starting salaries, $50,000 in 1989. By comparison, those starting their careers in government received a lower median salary of $43,800. University salaries are lower still, ranging from $34,000 to $40,500 depending on salary base.
- At entry level, the distribution of salaries in industry is fairly narrow, resembling that of other employment sectors. However, at more experienced levels, industrial salaries fall into a wider range than salaries in any other sector, reflecting the variety of career paths—from research to administration—available to individuals in the private sector. Some PhD's with 20 or more years of experience command salaries upwards of $120,000.

Table 5. 1989 salaries by major employment sector, PhDs.

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
University					
9–10 Month Salary	48.0	50.4	16.0	49	910
11–12 Month Salary	46.0	51.3	25.2	41	637
4-Year Colleges					
9–10 Month Salary	36.6	37.9	10.6	48	160
Industry/Self-Employed	63.5	69.0	25.8	43	1163
Government	56.0	56.9	13.1	47	368
FFR&DC	63.0	63.9	17.1	44	511
Nonprofit	59.0	59.5	23.1	44	117
Hospital	52.0	53.5	23.6	42	76

Table 6. 1989 salaries by years from degree, PhDs.

Years from Degree	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
0–4	38.0	38.6	12.7	32	645
5–9	49.0	48.8	15.0	36	646
10–14	55.0	56.9	18.3	41	608
15–19	61.1	62.1	19.5	46	684
20–24	63.0	66.2	26.2	50	655
25–29	65.0	68.0	22.9	55	414
30 +	70.0	72.8	25.5	62	431

Table 7. 1989 industrial salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
			(in thousands of dollars)						
0–4	41.0	45.0	50.0	54.6	59.6	50.2	8.3	32	172
5–9	45.0	53.0	58.0	63.0	70.5	58.5	10.7	36	227
10–14	50.0	57.0	65.0	75.0	85.0	67.6	19.1	42	212
15–19	53.0	61.1	70.0	84.0	95.0	73.7	19.9	46	192
20–24	54.5	63.4	75.0	93.0	120.0	84.1	35.9	51	159
25 +	56.0	65.0	80.0	100.0	120.0	85.3	32.4	59	184

[a] *In addition, there were 13 postdoctorates in the 0–4 years from degree group with a median salary of $40,500.*

Table 8. 1989 government salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
			(in thousands of dollars)						
0–4	36.0	40.0	43.8	48.0	52.0	44.2	8.4	34	34
5–9	38.0	43.9	46.0	51.0	62.1	47.8	9.3	37	44
10–14	41.5	47.3	53.5	58.3	64.0	53.4	9.2	42	53
15–19	48.4	52.0	57.0	66.0	73.0	59.0	9.2	47	86
20–24	50.0	58.3	63.3	72.0	75.0	63.9	11.3	50	61
25 +	53.0	63.0	72.0	74.5	76.0	68.2	9.2	59	72

[a] *In addition, there were 15 postdoctorates in the 0–4 years from degree group with a median salary of $33,500.*

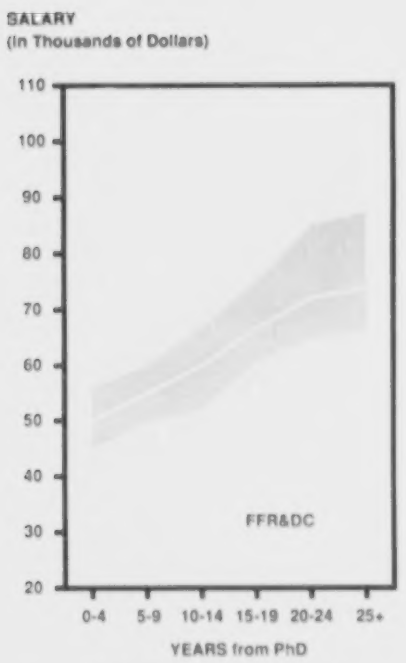

Figure 7. Salary structure in the national laboratories by years from PhD, 1989.

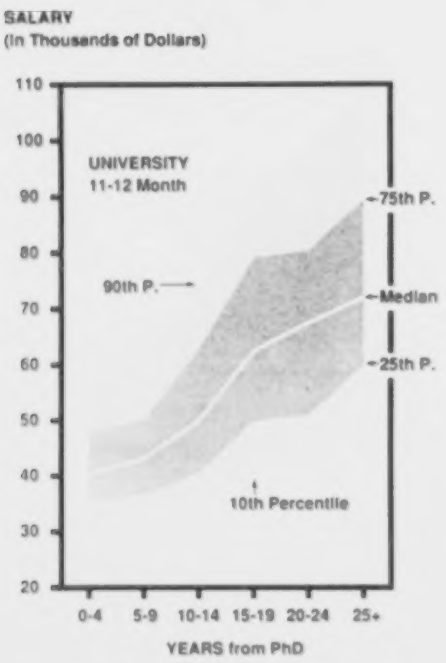

Figure 8. Salary structure in universities for 11–12 month salary base, by years from PhD, 1989.

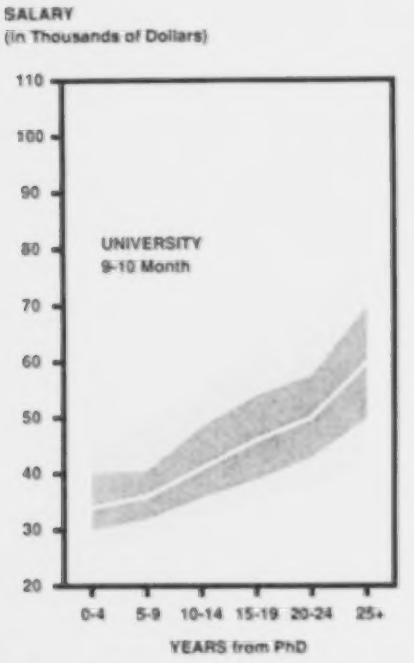

Figure 9. Salary structure in universities for 9–10 month salary base, by years from PhD, 1989.

• Salaries at the national laboratories, at a median of $63,000, lag slightly behind those in industry. However, the gap between the two medians has shrunk from $3,100 in 1987 to only $500 in 1989. Top salaries of experienced administrators at the national labs have passed the $100,000 mark but are still 15% below top industrial levels.

• At all levels of experience, PhDs in government receive lower salaries than individuals in industry and the national labs. The government salary structure differs from that in other employment sectors in that the range at upper levels of experience is quite narrow. This is due largely to federal salary ceilings and the use of civil service schedules in salary determination. According to the U.S. Office of Personnel Management, government employees working in physics in 1989 were classified on average as grade 13 on the General Schedule.

• Academics employed on an 11–12 month base typically receive salaries comparable to those in government. In contrast to the government salary structure, however, the academic salary range expands slowly and at a regular rate, broadening at the highest levels of experience. Individuals employed in universities on an 11–12 month pay base have a slightly higher and wider pay scale than their colleagues on a 9–10 month base, reflecting the variety of positions—including administration, non-faculty university staff, and faculty on year-round federal grants—available in such institutions.

Table 9. 1989 FFR&DC salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median (in thousands of dollars)	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	40.0	45.0	50.0	56.0	60.0	50.4	8.5	32	47
5–9	45.0	50.0	55.0	60.0	66.4	55.5	8.0	37	63
10–14	48.9	52.0	60.0	66.8	73.3	59.9	10.6	41	93
15–19	55.0	61.0	66.7	75.0	82.0	68.2	12.4	45	106
20–24	60.4	65.0	72.1	85.0	92.0	74.6	14.0	50	79
25 +	63.5	66.0	73.9	87.5	102.0	78.0	15.7	58	88

[a] *In addition, there were 30 postdoctorates in the 0–4 years from degree group with a median salary of $30,000.*

Table 10. 1989 university 11–12 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median (in thousands of dollars)	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	30.0	36.0	40.5	48.0	57.7	42.5	9.9	32	53
5–9	34.0	36.6	43.2	50.0	66.6	45.7	12.7	36	88
10–14	35.3	40.8	50.0	63.0	74.3	53.4	16.5	41	70
15–19	40.0	50.0	62.5	79.1	92.0	65.6	21.1	46	78
20–24	43.0	51.1	67.5	80.4	100.0	69.2	22.9	50	91
25 +	50.0	60.0	72.0	89.5	108.0	77.2	25.1	58	92

[a] *In addition, there were 140 postdoctorates in the 0–4 years from degree group with known salaries working in universities on an 11–12 month salary base. Their median salary was $25,000.*

Table 11. 1989 university 9–10 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 10th	25th	Median (in thousands of dollars)	75th	90th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–4	25.8	30.0	34.0	40.2	45.0	35.1	7.0	32	60
5–9	29.0	32.0	36.0	40.5	50.0	37.4	7.5	36	124
10–14	32.0	35.8	41.0	48.5	55.0	43.4	11.0	40	107
15–19	35.0	39.0	46.0	54.0	65.1	48.3	12.3	45	120
20–24	37.5	43.0	50.0	57.6	68.4	52.3	13.5	50	180
25 +	40.0	49.9	60.0	70.0	84.0	60.9	16.1	59	313

[a] *Postdocs excluded.*

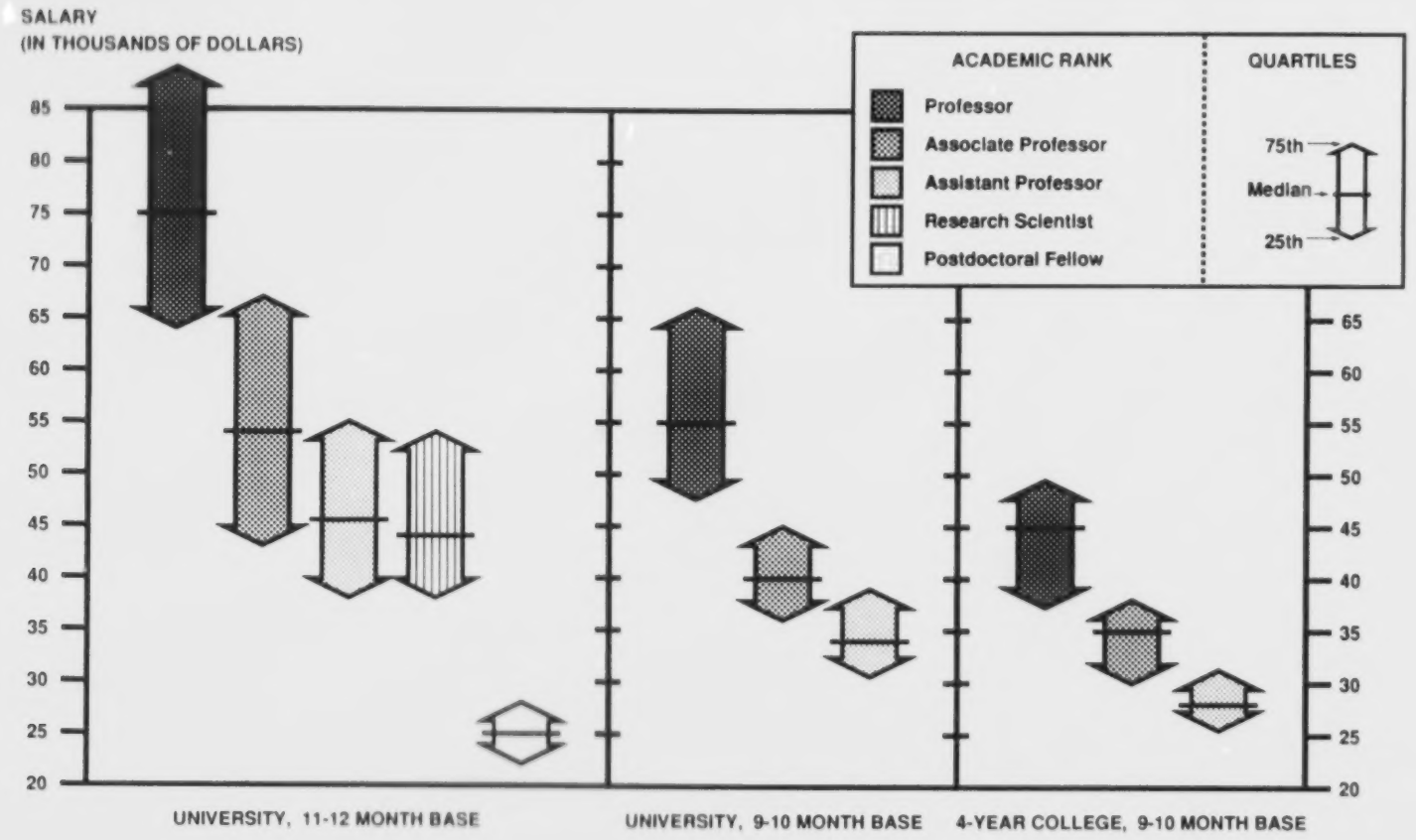

Figure 10. University and 4-year college salaries for PhDs by academic rank, 1989.

Salaries and Academic Rank

- Approximately 45% of society members with doctorates are employed in academe. Compared to their colleagues in other sectors, academics tend to be somewhat older and to be paid at a lower rate.

- Academic salaries vary a great deal among institutions, ranks, and subfields. University full professors employed on an 11–12 month salary base receive the widest range of salaries: between $64,000 and $89,000, on average, in 1989. This range reflects the variety of activities, from administration to grant-funded research, available to university professors. The highest salaries are earned by individuals holding appointments at university-affiliated hospitals or teaching in medical schools.

- Postdoctoral fellows receive the lowest median salary in academe, $25,000 in 1989. Although salaries for this group increased substantially in the mid-1980's, the median postdoctoral salary grew only 4% between 1987 and 1989 and appears to have stabilized. Fellows employed outside of academe earn somewhat higher salaries than their academic counterparts.

Table 12. 1989 university salaries by selected academic rank and salary base, PhDs.

	QUARTILE SALARIES 25th	Median	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)						
Professor							
9–10 Month Salary	47.6	55.0	66.0	58.1	14.8	54	546
11–12 Month Salary	64.0	75.0	89.0	78.2	22.2	51	176
Associate Professor							
9–10 Month Salary	36.0	40.0	45.0	41.2	7.6	43	183
11–12 Month Salary	43.0	54.0	67.0	57.7	19.3	45	63
Assistant Professor							
9–10 Month Salary	30.6	34.0	39.0	34.8	6.0	34	160
11–12 Month Salary	38.0	45.5	55.0	47.4	12.1	35	70
Research Associate (11–12 Month Salary)							
Postdoctorates	22.1	25.0	28.0	25.2	3.9	32	164
Other Research Staff	38.0	44.0	54.0	47.0	13.3	39	146

Table 13. 1989 4-year college salaries by selected academic rank on 9–10 month salary base, PhDs.

	QUARTILE SALARIES 25th	Median	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)						
Professor	37.3	45.0	49.5	44.5	10.5	52	80
Associate Professor	30.0	35.0	38.0	34.3	5.2	43	42
Assistant Professor	25.5	28.0	31.3	28.4	3.9	37	37

• The academic rank of research scientist combines aspects of both professorial and postdoctoral positions. Research scientists earn salaries comparable to those earned by assistant professors, although they are somewhat older. Furthermore, like postdoctoral fellows, they have few teaching responsibilities and are not eligible for tenure. In many cases, research scientists hold "soft money" positions which are dependent upon grants and other short term funding.

• Median salaries in four-year colleges ranged according to rank from $28,000 to $45,000 in 1989. These salaries are roughly 14–22% lower at each professorial rank than salaries earned by individuals employed in universities on a 9–10 month salary base.

• Based on data from over 750 colleges and universities nationwide, the College and University Personnel Association reports that physics faculty salaries are above the overall average salaries paid to all academics. In general, members of physics departments, like those throughout the physical sciences, earn more than their colleagues in education, the social sciences and the humanities. Faculty in accounting and engineering departments earn the highest average salaries, due, in part, to the fierce competition for young employees in these fields.

• In 1982, the median age of society members with a rank of full professor was 50. Since then, this figure has increased to over 53. As physics faculty reach retirement age in the mid-1990's, the dearth of younger assistant professors may affect the quality of both education and research. Conversely, the tight academic labor market may open up, creating a broader range of professional opportunities for individuals seeking academic careers.

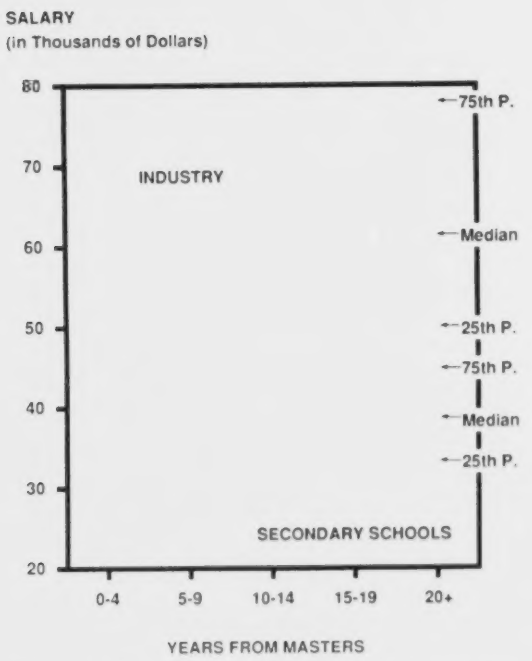

Figure 11. Salary structure in industry and secondary schools by years from Masters degree, 1989.

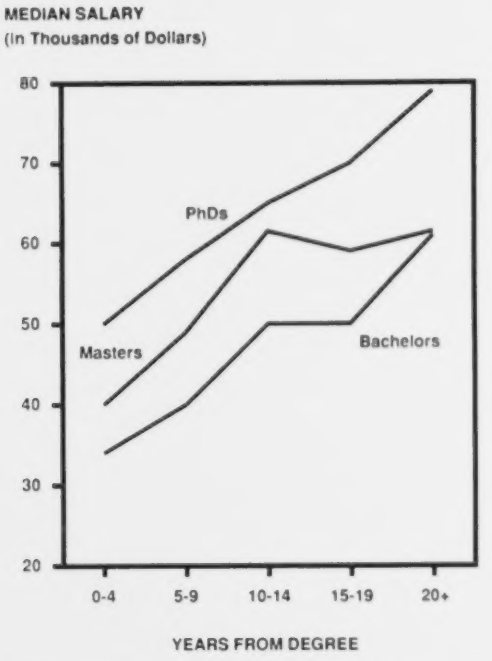

Figure 12. Median salaries in industry by degree level and years from degree, 1989.

SALARIES FOR MASTERS AND BACHELORS

• Nearly one-third of society members who hold exclusively masters or bachelors degrees are graduate students pursuing advanced training. There are, however, a sizeable number of non-student masters and bachelors degree recipients in physics employed by industry, secondary schools and government.

• Industry and secondary schools are the two largest employers of society members with masters degrees. The disparity in payscale between industry and secondary schools is striking. At the lowest levels of experience, high school teachers earn an average of $15,000 less than their colleagues in industry. This gap widens to $30,000 among those 10 –14 years from degree. In fact, median starting salaries in industry are higher than median salaries for society members in secondary schools with 20 or more years of experience.

• Industry employs nearly 60% of society members holding only bachelors degrees. It is also the only sector with enough members at each educational level to permit a comparison of salaries across degree. As a general rule, the more advanced the degree, the larger the median salary. For example, at entry level a bachelor earns an average of $34,000, a masters $40,000 and a PhD $50,000.

• Salary tables discussing lower degree holders must be interpreted with caution. Lower degree holders are poorly represented in the membership and those who are members tend to be atypical, with a special interest in specific society programs. In fact, the majority of masters and bachelors degree holders in the membership are advanced graduate students who are not included in these salary analyses.

Table 14. 1989 salaries by selected employment sector, Masters.

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
Junior College	35.5	36.1	8.7	49	67
Secondary School Teachers	33.5	34.3	9.3	46	225
Industry/Self-Employed	53.0	56.8	19.7	40	391
Government	47.5	48.4	12.0	43	81
FFR&DC	54.5	55.9	15.8	44	36
Hospital	51.0	54.0	16.0	38	57

Table 15. 1989 salaries by selected employment sector and years from degree, Masters.

	Years from Degree	QUARTILE SALARIES 25th	Median	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
		(in thousands of dollars)						
Secondary School (teachers only)	0–4	21.2	25.0	30.3	26.3	6.4	38	34
	5–9	25.0	32.0	36.0	31.2	7.5	39	27
	10–14	27.0	32.0	38.0	32.4	8.5	43	39
	15–19	30.0	33.9	42.3	36.1	8.3	46	58
	20 +	33.4	38.5	45.0	39.2	9.1	51	66
Industry/Self-Employed	0–4	35.0	40.0	45.7	41.7	9.3	30	78
	5–9	43.5	49.0	57.3	51.0	12.9	33	79
	10–14	49.5	61.5	70.0	61.4	18.1	38	67
	15–19	50.0	59.0	69.0	62.6	21.3	44	49
	20 +	50.0	61.5	78.0	66.2	21.6	55	116

Table 16. 1989 industrial salaries by years from degree, Bachelors.

	Median Salary	Mean Salary	Standard Deviation	Median Age	Total Number Known
	(in thousands of dollars)				
0–4	34.0	33.8	7.2	27	37
5–9	40.0	39.9	10.9	31	53
10–14	50.0	51.4	17.2	35	34
15–19	50.0	51.0	13.9	41	26
20 +	61.0	63.6	23.8	55	75

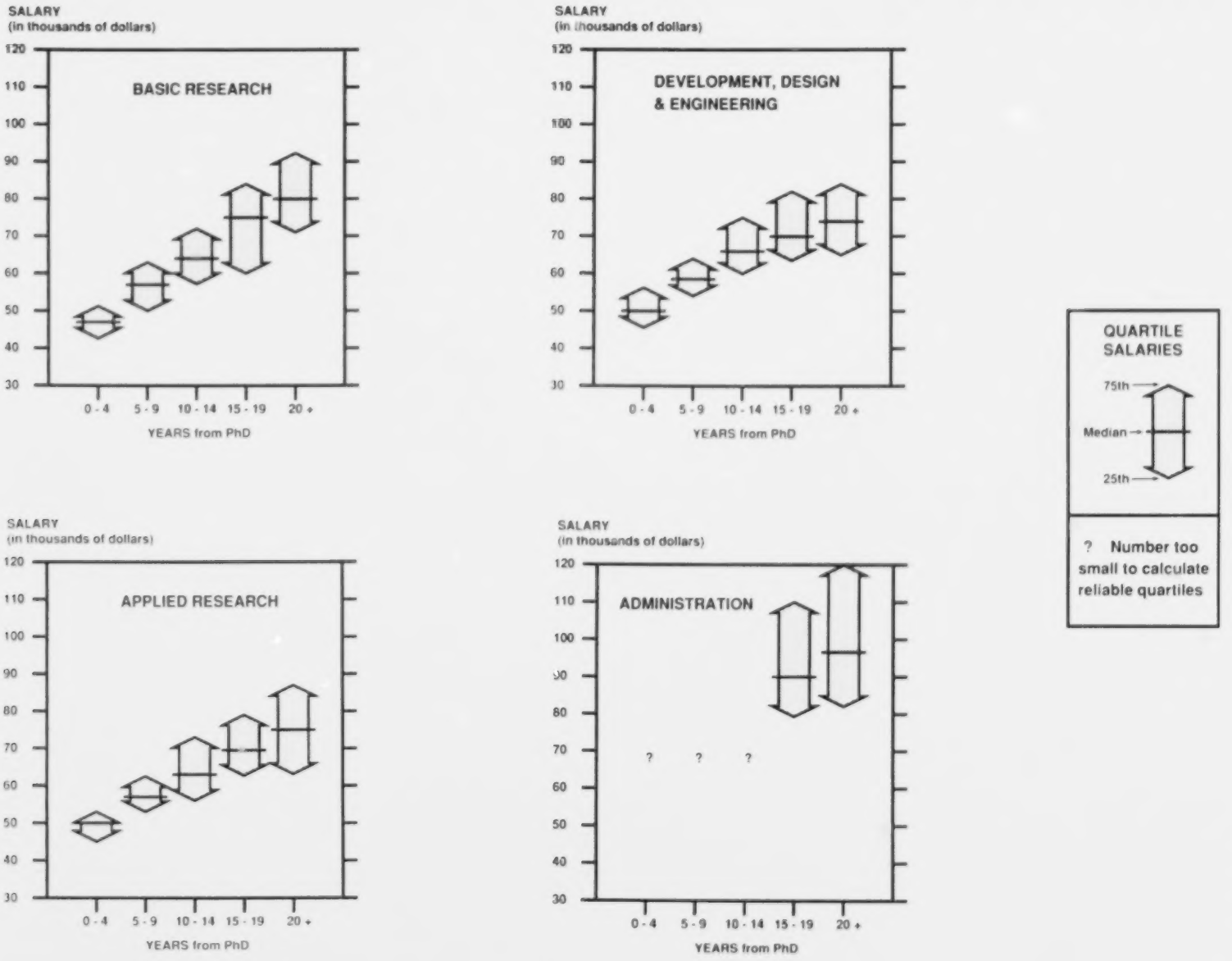

Figure 13. Industrial salaries by principal work activity and years from PhD, 1989.

Table 17. 1989 industrial salaries by primary work activity and years from degree, PhDs.

Years from Degree	QUARTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
Basic Research							
0–4	42.6	47.0	51.3	47.9	8.9	31	38
5–9	50.0	57.0	63.0	57.9	11.7	35	37
10–14	57.2	64.0	72.0	65.3	15.5	40	25
15–19	60.0	75.0	84.0	71.9	15.1	45	20
20 +	71.0	80.0	92.3	80.1	16.6	55	38
Applied Research							
0–4	45.0	50.0	53.0	49.9	8.0	32	89
5–9	53.0	57.0	62.5	57.5	7.9	36	101
10–14	56.0	63.0	73.0	65.1	12.3	42	87
15–19	62.7	69.5	79.0	71.0	13.0	46	74
20 +	63.1	75.0	87.0	78.8	21.3	55	133
Development, Design, and Engineering							
0–4	45.5	50.0	56.2	50.7	9.2	31	46
5–9	54.0	58.5	64.0	59.5	9.1	36	70
10–14	60.0	66.0	75.0	67.4	17.6	42	65
15–19	63.5	70.0	82.0	72.4	16.5	46	56
20 +	65.0	74.0	84.0	79.3	23.2	54	74
Administration							
0–4	*	*	*	*	*	*	0
5–9	*	*	*	*	*	*	4
10–14	*	*	*	*	*	*	14
15–19	79.3	90.0	110.0	97.0	33.5	46	18
20 +	82.0	96.6	120.0	110.1	55.2	55	57

**Number of respondents too small to calculate reliable quartiles.*

SALARIES AND PRIMARY WORK ACTIVITY

- Although salaries are influenced most by employment sector and years of experience, they also reflect the type of work performed. The widest range of work activities, as well as the widest range of salaries, exists in the industrial sector, which employs nearly 30% of society members holding doctorates.

- Median starting salaries for doctorates in industry fall into a fairly narrow range, regardless of work activity. In 1989, individuals with less than five years of work experience reported median salaries ranging from $47,000 for basic research to $50,000 for applied research, development, design and engineering.

- In addition to beginning their careers on par with one another, doctorates engaged in non-administrative industrial posts generally earn comparable salaries throughout their careers. However, a small cohort of professionals who work in basic research and who have been in the labor force for 15 years or more appear to be earning slightly higher salaries than their colleagues involved in more applied endeavors.

- Society members typically enter administrative positions after they have had 15 or more years of experience in the labor force. These individuals earn substantially more than their colleagues outside of administration, with median salaries $15,000 or more above the salaries of comparably experienced individuals employed in non-administrative positions.

Table 18. 1989 industrial salaries by sex and years from degree.

	Median Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
YEARS FROM DEGREE				
0–4				
Male	46.0	10.3	31	257
Female	43.5	10.1	30	45
5–9				
Male	55.0	13.3	35	334
Female	51.6	13.5	35	30
10 -				
Male	68.0	27.2	48	1116
Female	55.4	17.1	43	31

PhD SALARIES FOR MALES AND FEMALES

• Among society members, only 6% of PhDs and 12–13% of Masters and Bachelors are women. The representation of women has increased somewhat since the early 1980's, especially at the lower degree levels. In 1983, for example, less than 5% of PhDs and 7–8% of Masters and Bachelors were women. (The American Geophysical Union, which has a higher proportion of women than the other Member Societies, joined AIP in 1987 and is not included in these figures.)

• In general, males with doctorates earn higher salaries than their female counterparts. This difference in salary is due in part to the fact that men have been out in the workforce longer. However, age and experience do not account for the disparity completely. Other factors which may contribute to the difference include employment patterns, career paths, and discrimination.

• When compared to men, women are less likely to be employed in industry or the national laboratories and more likely to work for secondary schools. Only one quarter of female society members, as opposed to one-third of males, work in industry. Conversely, secondary schools employ approximately 18% of female society members, compared to less than 5% of the males. Some, but not all, of the variation in employment sector by gender can be attributed to the fact that a higher percentage of male society members have doctorates.

Table 19. 1989 university salaries by sex and years from degree.

	Median Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
YEARS FROM DEGREE				
0–4				
Male	38.0	9.5	32	111
Female	35.0	10.5	31	15
5–9				
Male	39.0	11.6	36	205
Female	35.0	8.6	37	23
10 +				
Male	54.4	19.8	51	1088
Female	46.0	15.1	48	62

• In industry, the largest gap in compensation occurs at the highest levels of experience; in 1989, men who had been in the labor force for over 10 years received a median salary $12,600 over that of women of the same cohort. This disparity results in part from the fact that women at this level are five years younger, on average, than their male colleagues and are less likely to hold top-paying administrative positions. At lower levels of experience in industry, men also receive slightly larger salaries than women, although the difference is less marked.

• The disparity between men's and women's salaries in academe follows a pattern similar to that of industry. At lower levels of experience, the salary differential is small, $3,000 –$4,000, and men are only slightly older than women. Among academics with ten or more years of experience, the gap between men's and women's earnings grows to $8,400. Age is one factor contributing to this difference; men are three years older than women in this group. Some of the disparity may also be due to the fact that, at this level of experience, a larger proportion of men than women are full professors. However, even after adjusting for differences in age and academic rank, men's salaries still outpaced women's.

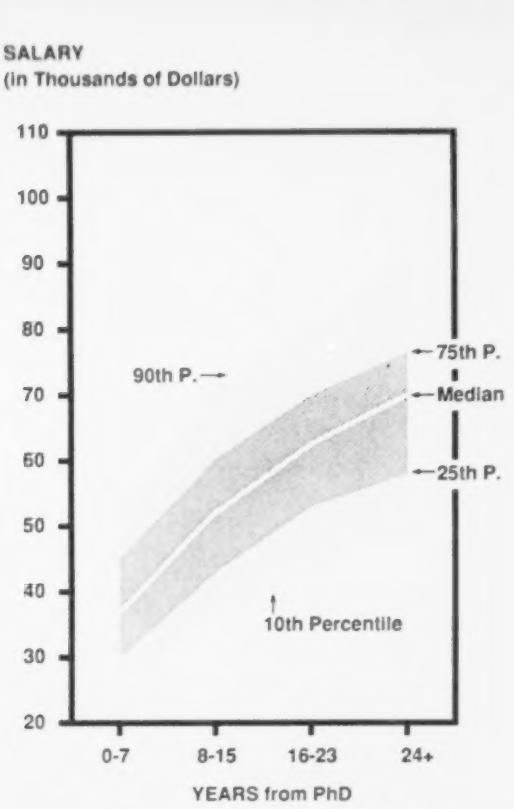

Figure 14. Salary structure by years from PhD, 1989 AGU.

Table 20. 1989 AGU salaries by major employment sector, PhDs.

	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
University					
9–10 Month Salary	42.0	44.4	13.0	43	137
11–12 Month Salary	48.0	50.8	20.7	42	151
Industry/Self-Employed	64.0	66.7	21.3	42	108
Government	54.0	54.1	13.3	46	191
FFR&DC	62.0	64.4	11.4	43	47

Table 21. 1989 AGU salaries by years from degree, PhDs.

Years from Degree	Median Salary	Mean Salary (in thousands of dollars)	Standard Deviation	Median Age	Total Number Known
0–7	37.0	39.1	12.0	35	220
8–15	52.0	53.5	16.0	41	194
16–23	62.5	62.7	13.9	49	181
24 +	70.0	69.8	20.3	58	115

SALARIES AND EMPLOYMENT SECTOR FOR PhDs, AMERICAN GEOPHYSICAL UNION

- Only "regular members" of AGU were sampled in 1989. AGU fellows, lifetime members, and those holding student memberships were excluded from the sampling frame. Because these "non-regular members" were included in the 1987 analysis, the data presented here are not comparable with the salary data published for 1987.

- Salaries paid to AGU members vary by employment sector. The highest paid AGU members work in industry, where the overall median salary in 1989 reached $64,000. National laboratory employees also fared well, reporting a median salary of $62,000. By comparison, academic salaries fall considerably below these levels. This is consistent with the pay structure found among members of the other nine Member Societies.

- As a rule, salaries increase with experience. A new entrant into the labor force, that is, a PhD with less than eight years of experience, can expect to earn anywhere from $32,500 to $50,000 per year, depending on sector of employment. This figure climbs steadily to a high of $70,000, earned by those with 24 or more years of experience.

Table 22. 1989 AGU industrial salary structure by years from degree, PhDs.

Years from Degree	PERCENTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–7	40.0	50.0	63.0	51.3	14.8	36	37
8–15	59.4	70.0	85.0	75.1	20.5	41	27
16–23	60.0	75.0	87.0	75.4	15.0	49	29
24 +	*	*	*	*	*	*	12

**Number of respondents was too small to calculate reliable statistics.*

Table 23. 1989 AGU government salary structure by years from degree, PhDs.

Years from Degree	PERCENTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–7	37.0	40.0	45.0	41.6	7.8	37	40
8–15	45.2	50.0	58.0	51.6	8.7	42	50
16–23	53.5	60.0	66.6	60.4	9.0	50	59
24 +	63.0	70.0	74.0	66.8	10.2	58	33

- The overall median salary of government employees rose to $54,000 in 1989, placing government somewhere between industry and academe in terms of pay. However, government employees are, on average, three to four years older than their colleagues outside of government. This tends to inflate the overall median government salary. Controlling on years of experience, the government salary structure closely resembles the structure reported by university members who are employed on an 11–12 month salary base.

- While fewer AGU members are employed in national laboratories than in industry or academe, AGU members can be found at 15 different labs nationwide. Members are concentrated at four installations: Jet Propulsion Laboratory, Los Alamos National Laboratory, Lawrence Livermore National Laboratory and Sandia National Laboratory.

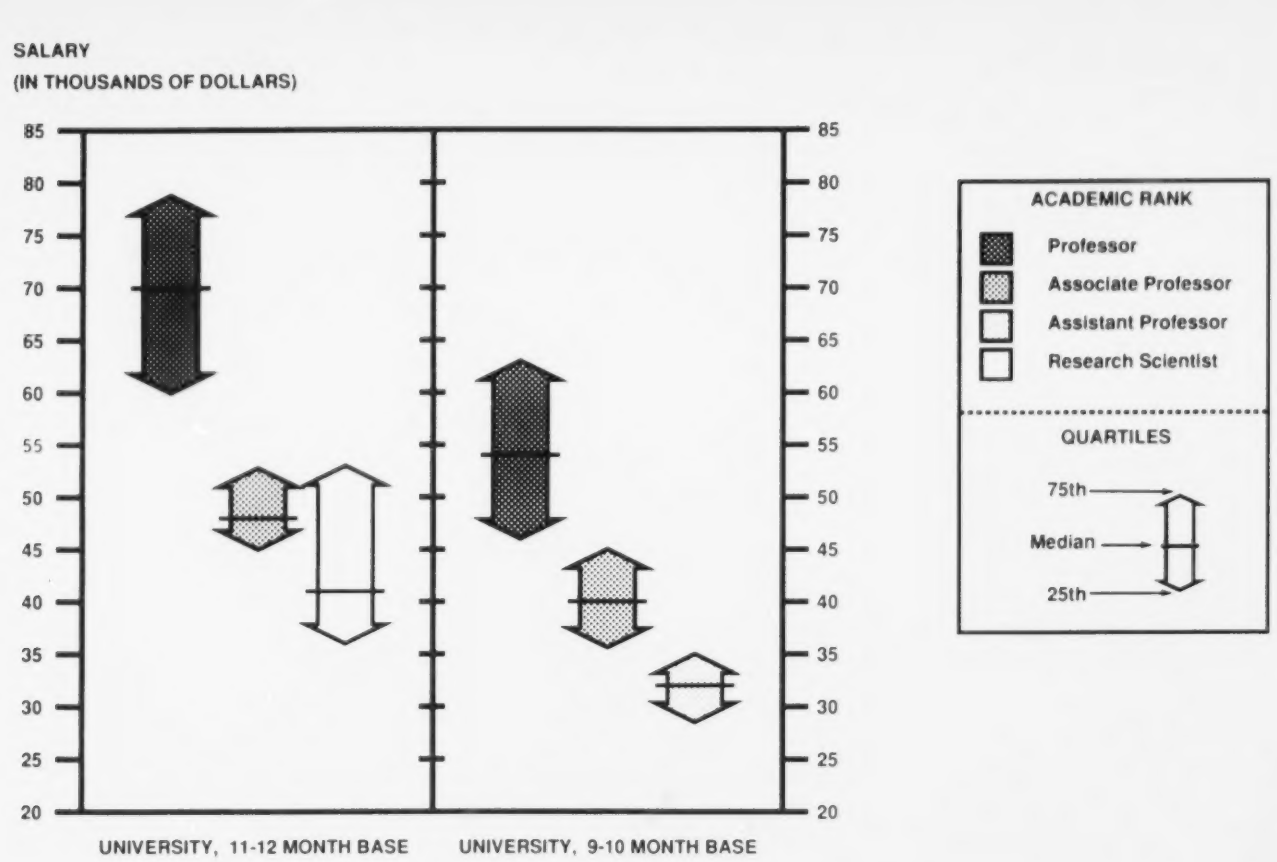

Figure 15. University salaries for PhDs by academic rank, 1989 AGU.

- Universities are the largest employers of AGU members. In 1989, typical university salaries ranged from $42,000 for those on a 9–10 month salary base to $48,000 for those on an 11–12 month base.

- At every level of experience, university salaries fall well below the salaries paid to individuals employed in industry. The industrially employed earned 17–47% more than their colleagues working in universities on 11–12 month contracts.

Table 24. 1989 AGU university 11–12 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–7	36.0	40.0	46.0	40.3	7.4	35	36
8–15	41.0	47.6	54.0	48.0	12.0	41	30
16–23	51.0	64.0	74.7	63.4	13.1	49	35
24 +	64.0	75.0	90.0	78.9	20.7	60	23

[a] In addition, there were 26 postdoctorates in the 0–7 years from degree group with a median salary of $28,000.

Table 25. 1989 AGU university 9–10 month salary structure by years from degree, PhDs.[a]

Years from Degree	PERCENTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
0–7	29.0	32.5	35.2	33.3	6.3	34	40
8–15	35.6	40.0	50.0	41.8	8.1	40	41
16–23	43.0	50.8	61.0	52.4	10.9	48	27
24 +	50.0	54.0	63.0	55.8	13.0	56	27

[a] Postdocs excluded.

Table 26. 1989 AGU university salaries by selected academic rank and salary base, PhDs.

	QUARTILE SALARIES 25th	Median (in thousands of dollars)	75th	Mean Salary	Standard Deviation	Median Age	Total Number Known
Professor							
9–10 Month Salary	46.0	54.0	63.0	55.5	11.4	51	55
11–12 Month Salary	60.0	70.0	78.8	71.7	13.8	54	41
Associate Professor							
9–10 Month Salary	35.6	40.0	45.0	40.5	7.1	40	42
11–12 Month Salary	45.0	48.0	52.8	49.6	7.6	40	17
Assistant Professor							
9–10 Month Salary	28.5	32.0	35.0	32.6	4.8	34	35
11–12 Month Salary	*	*	*	*	*	*	10
Research Associate (11–12 Month Salary)							
Postdoctorates	24.0	28.0	30.0	26.9	4.2	33	26
Other Research Staff	36.0	41.0	53.0	46.0	13.7	40	53

**Number of respondents was too small to calculate reliable statistics.*

APPENDIX A: GEOGRAPHIC DIVISIONS

NEW ENGLAND
Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont

MIDDLE ATLANTIC
New Jersey
New York
Pennsylvania

SOUTH ATLANTIC
Delaware
District of Columbia
Florida
Georgia
Maryland
North Carolina
South Carolina
Virginia
West Virginia
Puerto Rico

EAST NORTH CENTRAL
Illinois
Indiana
Michigan
Ohio
Wisconsin

EAST SOUTH CENTRAL
Alabama
Kentucky
Mississippi
Tennessee

WEST NORTH CENTRAL
Iowa
Kansas
Minnesota
Missouri
Nebraska
North Dakota
South Dakota

WEST SOUTH CENTRAL
Arkansas
Louisiana
Oklahoma
Texas

MOUNTAIN
Arizona
Colorado
Idaho
Montana
Nevada
New Mexico
Utah
Wyoming

PACIFIC
Alaska
California
Hawaii
Oregon
Washington

APPENDIX B: TECHNICAL NOTES

Median

The median, a measure that is frequently used in this report, is that point in a distribution above and below which 50% of the values fall. Since it is less influenced by extreme values than the arithmetic mean, it is the preferred descriptive measure of central tendency in typically skewed salary and age distributions. In most of the tables, both median and mean salaries are presented; observed differences reflect the skewness in the distributions.

Quantile Calculations

The P-STAT statistical package was used to compute the medians and other quantiles presented in the salary tables and figures. Percentiles were not interpolated when the requested quantiles fell a certain fraction into a group of equal values or when fractional weights were used.

Quantiles and Interquantile Ranges

Ninety percent of the values in a distribution fall below the ninth decile, seventy-five percent below the third quartile, twenty-five percent below the first quartile and ten percent below the first decile. The interdecile and interquartile ranges, which indicate differences between deciles and between quartiles, are measures of variation within distributions and are used in several of this report's figures.

Employment Base

Salary data are presented for current society members who are employed full-time in the U.S. Students are not included.

Sampling Error

The salary figures in this report may be affected by different sources of error. Society members who did not respond may have had somewhat different salaries than those who did respond, thus introducing response bias. Although earlier surveys in this series estimated that the effects of response bias were minor, the possible effect remains. A fuller explanation of response bias is presented in the methodological appendices of the membership profiles.

Since the data in this report are based upon a small random sample, they are also subject to sampling error. The variability introduced by the sampling procedure depends both on the size of the sub-group being examined, and the variation of values in the population. The formulas below present conservative estimates of the standard error based on simple random sampling. When standard errors were calculated, taking into account the minor stratification by society used in the sampling, slightly lower estimates resulted. Confidence intervals for proportions, means and medians can be determined as follows:

Medians:

M_1, *that point below which* p_1^{th} values fall,
M_2, *that point below which* p_2^{th} values fall,

where

$$p_1 = p + Z\left(\frac{p(1-p)}{n}\right)^{1/2}, p_2 = p - Z\left(\frac{p(1-p)}{n}\right)^{1/2},$$

and

$p = 0.5$,
n = sample size,
z = coefficient of confidence, 1.96 at the 95% confidence level.

Means:

$\bar{x} \pm Zs/(n)^{1/2}$, *where*
$\bar{x}$ = the arithmetic mean,
s = standard deviation,
n = sample size, and
Z = coefficient of confidence 1.96 at the 95% confidence level.

Proportions:

$$p \pm Z\left(\frac{p(1-p)}{n}\right)^{1/2}$$

p = sample proportion observed.
n = sample size, and
Z = coefficient of confidence, 1.96 at the 95% confidence level.

Cost of Living Index

The cost of living index used in this report was developed by the American Chamber of Commerce Researchers' Association (ACCRA). Its purpose is to provide "a useful and reasonably accurate measurement of inter-city cost of living differences." The index measures "relative price levels for consumer goods and services in participating cities, as compared with the national average for all participating cities (metropolitan and nonmetropolitan)." Differences of more than three index whole numbers in the all-items index can be considered to represent actual inter-city differences in the cost of consumer goods and services; but the percentage difference in such cases should be considered a reasonable indication, rather than a precise measure, of the extent of the differences.